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# On the nature of ferromagnetism in oxide semiconductors doped with 3d-elements

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## Abstract

The origin and mechanisms of ferromagnetism in the new class of magnetic materials, oxide-diluted magnetic semiconductors (ODMS), are examined in a framework of the Stoner-Anderson model. Within the Green function formalism, a condition (the Stoner criterion) for nucleation of ferromagnetism is obtained for itinerant electrons in the narrow defect (vacancy) band, and an additional contribution due to interaction with 3d magnetic ions is derived. The "trigger" character of the transition to the ferromagnetic state in ODMS is discussed in its dependence on the type and concentration of 3d magnetic impurity dopant. The results of calculations are compared with the experimental data for the spontaneous magnetic moment in semiconducting titanium dioxide (TiO2) doped with 3d magnetic ions and containing various concentrations of oxygen vacancies.

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